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WOODEN HOSPITALS:

THEIR ADVANTAGES FROM A SANITARY
POINT OF VIEW.

BY JOHN DAY, M.D.

GEELONG.



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WOODEN HOSPITALS: THEIR ADVANTAGES FROM A SANITARY POINT OF VIEW.

BY JOHN DAY, M.D.

A paper read before the Medical Society of Victoria, 5th August, 1874.

During the last few years it has been observed in various parts of the world that certain diseases, such as Pyæmia, Erysipelas, and Puerperal Fever, which are so common and so frequently fatal in ordinary hospitals, rarely, if ever, occur in hospitals constructed of wood.

It will be sufficient for my purpose to draw your attention to two notices which have recently appeared in the home journals on this subject, the one in the *Medical Times and Gazette* of December 13th, 1873, and the other in the *Lancet* of April 4th, 1874.

The *Medical Times and Gazette*, in noticing an interesting account of "A Recent Visit to the Medical Faculty of Liepzig," communicated to the *Gazette Hebdomadaire* of December 5th, by Dr. D'Espine, says:—"The hospital, which has been rebuilt during the last two or three years, consists of fourteen large sheds (if such a name can be given to what are really elegant pavilions), connected together by a covered gallery, and looking on to the garden. Each wooden shed rests on a stone support of about a metre in height, this facilitating ventilation. Warm air also is generated by a calorifer, which heats the sheds far better than the large Leipzig stoves, which in winter do not give sufficient warmth. Ventilation also takes place by the roof, which is open at the sides, windows protecting from the cold during a portion of the day in winter. Each shed contains from twenty to twenty-four beds, a separate chamber, baths, a small kitchen, and the closets, which are in the ward itself, any ill effect which might arise from this last arrangement being effectually prevented by the employment of earth-closets, of which the medical officers speak in high terms. Water is laid on to each shed, and in the centre of the ward is a large lavabo, with cocks for cold and warm water. The ward communicates through an ante-chamber with the gallery, except in the case of two or three of the sheds, which are isolated for contagious diseases. The central portion of the hospital is of stone, being in fact the old building, now exclusively devoted to paying patients, who have each their separate room. The sheds constitute the clinic, under the direction of Professor Thiersch for surgery, and of Professor Wunderlich for medicine. The Maternity is in the town, no lying-in-women being admitted into the hospital. During the twelve months, August 1872-73, Professor Thiersch has performed

266 serious bloody operations, and has not lost a case from pyæmia, while, prior to the construction of the shed-hospitals, he lost from forty to fifty amputations from this cause annually. Whether such a splendid result will be maintained, or whether these wooden hospitals themselves will not become infected, remains to be seen; at all events, the resource of burning them at the end of a certain number of years remains."

The *Lancet* says:—"We have received a pamphlet 'On Hospitals, Cottage Hospitals, and Ventilation,' by Dr. Charles Shrimpton, which contains much that is true, though not new. With reference to the treatment of puerperal cases in hospitals, he records that, in the little wooden hut used by the soldiers' wives on the edge of Shorncliffe, and open to all winds, 'there had been, up to the 29th of December, 1869, 702 deliveries without one single death from puerperal disease,' and that, in a similar hut in the camp at Colchester, up to October, 1870, 202 deliveries had been registered, and no deaths."

Now, the saving of from forty to fifty lives in one year in the Liepzig Hospital alone, by the mere substitution of wood for stone and plaster, all other conditions being the same, is a grand fact, and one which can hardly be explained by the better ventilation that such buildings would probably afford. The true cause, therefore, of the non-existence in wooden hospitals of pyæmia and other septic diseases, which in ordinary hospitals are of such common occurrence, becomes a most interesting subject for investigation.

I have looked to chemistry for a solution of the question, and find that certain kinds of wood, such as red or yellow deal, American pine, and white deal or spruce, possess the property of acting on atmospheric oxygen, and converting it into peroxide of hydrogen,—a substance remarkable for its power of destroying the offensive products of decaying organic matter. This property, however, only shows it to be a deodorant; but I am, I believe, in a position to offer you evidence, very nearly allied to proof, that it is also a disinfectant in the true sense of the word, viz., that it is capable of oxidizing and destroying zymotic poisons.

Since April, 1873, twenty-eight cases of scarlet fever have come under my care, occurring in twenty different houses. There were persons in each house who had not had the disease, and in most cases there was very little effort made to isolate the patients, yet, with two exceptions, there was no extension of the disease in any of these houses after I had commenced the treatment I am about to describe, and in the two instances in which the disease did spread, the new cases—four in one house, and one in the other—all presented themselves within five days of the primary ones, thus justifying the assumption that they were infected prior to the commencement of my treatment, the period of incubation in scarlet fever being from four to six days.

My plan is as follows:—I have the patients freely rubbed over the whole surface of the body with ethereal solution of peroxide of hydrogen—erroneously called ozonic ether—mixed with lard, in

the proportion of one part to eight ; this process to be repeated three times a day, and continued for a fortnight or three weeks.

By this simple means I feel satisfied that the scarlet fever poison may be oxidized and destroyed as it leaves the body, and the chances of infection reduced to a minimum, being confined to the contagious matter given off by the breath.

I claim for this mode of treatment two great advantages :—
1st. The patients, during the whole period of the attack, are enabled to breathe a pure atmosphere, instead of, as under ordinary circumstances, an atmosphere contaminated by the poisonous emanations from their own bodies. 2nd. It affords the practitioner an effectual means of arresting the spread of the disease.

It may be in the memory of some of you that, at a meeting of this Society in July, 1871, I suggested a somewhat similar means of arresting the spread of small-pox.

It is most likely that during the discussion on this paper I shall be told that inunctions with greasy substances, such as olive oil or lard, are now extensively used by the profession at home for the purpose of arresting the spread of scarlet fever, and that they act by mechanically fixing the poison.

To this I would reply that all fats and oils, whether derived from the animal or the vegetable kingdom, contain peroxide of hydrogen, and that it is not by mechanically fixing the poison-germs, but by chemically oxidizing and destroying them, that these inunctions are often found to be of service in arresting the spread of scarlet fever and other infectious diseases. The quantity, however, of peroxide of hydrogen that different fats and oils contain is so variable that it is far better to employ it of a given strength, in the manner I have indicated.

At one of our meetings towards the close of last year, I had the pleasure of drawing your attention to the previously unrecognised property that all fats and oils possess of absorbing oxygen from the atmosphere, and converting it into peroxide of hydrogen ; and many of you will, I am sure, be glad to learn that my views on this subject have recently been endorsed by two such high authorities as Professor A. S. Taylor and Dr. W. Bathurst Woodman.

Now for the proof that the different kinds of wood I have named are really capable of generating peroxide of hydrogen. On the table before us are various specimens of red or yellow deal, American pine, and white deal or spruce, and I will apply to each of them the most reliable of all known tests for peroxide of hydrogen, viz., the colouring matter of blood and tincture of guaiacum. As you all probably know, peroxide of hydrogen alone, although a powerful oxidizing agent, is incapable of oxidizing and turning blue the resin of guaiacum, but in the presence of blood it acquires increased activity and does so readily. I will, therefore, put a little watery solution of blood on each of these specimens, and then pour over them some tincture of guaiacum, when you will perceive that, wherever there is blood, the spots will be turned blue through the agency of the peroxide of hydrogen contained in the wood. You

will find that the red or yellow deal, particularly that obtained from the Baltic, gives by far the most powerful reaction, consequently it generates and condenses the largest amount of peroxide of hydrogen ; the American pine ranks next, and the spruce last.

There can be little doubt, I think, that the property these woods possess of generating peroxide of hydrogen is in a great measure, if not entirely, due to the turpentine they contain ; and it is worthy of remark that oil of turpentine has been found of the greatest value, both as an external and internal remedy, in the treatment of erysipelas, pyæmia, and puerperal fever.

Baltic deal is a very durable wood ; I have been told by builders that, if kept off the ground, it will last for a hundred years or more. It is also very cheap. Therefore, in point of economy, durability, and healthfulness, Baltic deal, on a stone foundation, would seem to be preferable to any other material for the construction of hospitals.

If my theory be correct, soap should never be used in washing the floors of hospitals, for all alkalies destroy peroxide of hydrogen, and of course the free alkali in the soap would have that effect. Indeed, it has been observed by Professor Parkes and others that, in hospitals where erysipelas prevails, the disease spreads more rapidly when the floors are washed than when they are kept dry. The floors of hospitals, therefore, should be waxed and polished. This is usually effected by first staining the floor with burnt umber rubbed down with linseed oil, and then covering it with a thick paste made of yellow wax and oil of turpentine, which should be well rubbed in, and afterwards polished.

Now, as two of the ingredients used in this process—viz., the linseed oil and the oil of turpentine—possess the property of continuously generating peroxide of hydrogen, a floor thus prepared is rendered permanently disinfectant.

In hospitals for contagious diseases the bedding may be stuffed with thin shavings of Baltic deal or American pine, and frequently changed. These shavings generate peroxide of hydrogen very freely, and continue to do so for a long time, therefore, they would seem to be well suited for the purpose I have indicated, both on account of their cheapness and their disinfectant properties. I may remark, that some shavings I have had in my possession for more than three months are now more highly charged with peroxide of hydrogen than they were when quite fresh. In addition to the blood and guaiacum test, I will apply to some of them a solution of iodide of potassium, when you will find that the iodine will be quickly liberated ; this is a well-known test for peroxide of hydrogen. In applying it the shavings should be laid on white paper, the starch of which will combine with the iodine as it is set free, and give rise to the characteristic blue reaction.

Saw-dust, although used by butchers and others for mere purposes of cleanliness, is in reality a disinfectant. A very agreeable deodorant and disinfectant may be made by mixing about an ounce of the eucalyptus oil obtained from the *amygdalina odorata* species, with a bushel or more of clean red or yellow deal sawdust. Here is a

specimen of it. When first prepared, some few months ago, it gave only a feeble reaction with a solution of iodide of potassium ; now, it reacts very freely, thus showing that it improves by age.

In conclusion, I would claim for wooden hospitals the following advantages :—

1st. That, instead of requiring constant purifying and disinfecting as other hospitals do, they purify and disinfect themselves.

2nd. That peroxide of hydrogen, the disinfecting agent they generate, contains oxygen—Nature's disinfectant—in a highly condensed and active form, which, moreover, is intensified in the presence of either blood or pus—a property which renders it pre-eminently adapted for hospital disinfection ; for it is beyond doubt that pus-cells, in combination with other organic matter, are largely concerned in the causation of those septic diseases which are so destructive to life in ordinary hospitals.

3rd. That, in consequence of the above-named conditions, the inmates of wooden hospitals enjoy almost, if not perfect, immunity from hospital gangrene, erysipelas, and puerperal fever.

Dr. BOWEN desired to know from the author if the coating of wooden buildings with paint neutralised the effect of the wood.

Mr. GIRDLESTONE had himself been impressed with the value of wooden huts for hospital purposes. They had been well spoken of by hygienists in connexion with the American war, &c. Indeed the fact of their utility was obvious ; the explanation less so. It had been variously attributed to the better ventilation, to the facility of selecting suitable sites, and to the possibility they suggested of supplying new material at small cost. Until Dr. Day took up the subject, however, he was not aware that any writer had explained their value on antiseptic grounds. The condition of their being of a particular kind of wood seemed unavoidable. The economic value of the suggestion was also considerable. He thought, however, that if they came to be adopted, some contrivance would be necessary to warm them in winter. Mr. Erichsen had laid great stress on the necessity of separating the cases in a hospital wherever the generation of septic poison was likely. The use of wooden hospitals in quarantine was self-evident.

Mr. GILLBEE bore testimony to the value of wooden huts as an adjunct of the Melbourne Hospital. He had not however been previously aware that the special recommendation was derived from the material of which they were constructed. He had not found the absence of contrivances for warming them a disadvantage.

Mr. RUDALL's experience corroborated the opinions expressed as to the value of wooden hospitals.

Mr. JENKINS remembered that in the brigade numbering 900 to which he was attached in the Crimea during the first winter there, the men lived in wooden huts. There were no deaths, and yet among the French, only half a mile off, in half sunken tents, the deaths were very numerous.

Dr. BLAIR wished to know if Dr. Day thought the antiseptic quality of the woods used would become lessened by much drying,

or after much exposure. A patent horse-bedding had lately been introduced. It was composed chiefly of eucalyptus leaves, and so would, he supposed, be found to be disinfectant.

Dr. SINGLETON had found the mortality in Collingwood to be less in those localities where the buildings were of wood. A replanning of the wood, or the use of fresh sawdust between the boards would probably revive the antiseptic quality.

Mr. ROBERTSON enquired if Dr. Day had applied his test to the colonial hard woods.

Dr. DAY, in reply to Dr. Bowen said, that the substances used in the composition of house paints, *e. g.* oil of turpentine, were themselves disinfectant. To Mr. Girdlestone, any wood with an odour would he thought suffice. Pus more than blood acted upon the peroxide of hydrogen, and therefore pus cells settling on the walls of a wooden hospital would be readily decomposed. Lime-washed walls would, being alkaline, decompose the peroxide when it was used for disinfecting purposes. To Dr. Blair, he could hardly say if the properties of wood would be impaired by exposure or drying. So far as he had observed, the qualities had not been diminished by time. He had employed, in a case of phthisis, a pillow of gum-leaves with some advantage.

